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## CENTRAL AFRICAN FORESTS AS HUNTER-GATHERERS' LIVING ENVIRONMENT: AN APPROACH TO HISTORICAL ECOLOGY

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**ABSTRACT** While tropical rainforests in central Africa are often assumed as “green desert” where human cannot live by entirely depending on wild food resources, recent studies suggest that hunter-gatherers could survive there even in the dry season, when food resources are relatively scarce. Newly found archaeological investigations also suggest the existence of early, hunter-gatherers' habitation in the forests of central Africa. Recent field research in Cameroon by Yasuoka (2006; 2009a) showed the key food to sustain the forest life is comprised of wild yams with annual stems, which are gregarious and found only in limited “gaps” formed under supposedly human influences in the past. Other forest food species are also found more in secondary forests than in mature forests, as reported in previous studies. Moreover, there are increasing evidences that show the distribution of a variety of human-induced vegetations throughout the equatorial forests of Africa. It is necessary, therefore, to examine the implications of such human-induced vegetations for understanding the history in the region. It is also important to examine the forest ecosystem and landscape in a perspective of historical ecology, i.e., from the viewpoint of interactions between man and forest environment, which may provide the forest peoples with a basis for claiming customary rights to the forests.

**Key Words:** Hunter-gatherers; Food resources; Human influences; Vegetation; Customary rights.

## INTRODUCTION

The Congo Basin Forest covers an area of approximately 170 million hectares, and is the second largest tropical forest block in the world after the Amazon. The forest in this region attracts global attention for various reasons. First, for its wood resources, which comprise one of the major export products, bringing substantial national revenues. Second, for its biological diversity, which is the first in Africa in the diversity of mammal and bird species, and third in floral diversity (Debroux et al., 2007). There are also rare and endangered species, such as okapis, forest elephants, leopards, lowland and mountain gorillas, chimpanzees and bonobos, and a variety of other primate species. For such a rich biological diversity, conservationists set 11 landscape areas in the region for nature conservation and sustainable management of the natural environment (OFAC, 2008). Thirdly, there is a growing interest in their global environmental services; in particular, the interest in the forest as carbon sequesters, because tropical forests are said to store 250–300 tons of carbon/ha of forest area (Debroux et al., 2007).



**Fig. 1** Distribution of indigenous people (Pygmy hunter-gatherers) groups in central Africa and years of research (in parentheses) by Kyoto University group.

The conservation of tropical rainforests is now an issue throughout the world, the emphasis often being laid on the fact that it is a “global” problem. The destruction of tropical rainforests is linked to the disappearance of biological diversity, including rare and endangered species, and of the gene pool. It also causes global warming by increasing the carbon dioxide in the atmosphere. These are issues for all human beings that must be addressed on a global scale. Based on this awareness, a lot of financial and human resources have been input into this problem, and research on tropical rainforests as well as conservation activities are taking place throughout the world. Activities related to tropical rainforests are now developing under a global network with the involvement of a wide range of fields such as politics and economics, scientific research, education and publicity, as well as actual conservation activities.

But there is a problem that had gone little noticed in all this until recently: the interrelationship between the forest and the people who live there. There are in the Congo Basin forests almost 60 million local people who depend heavily on the forest resources for fuels, food, medicine, construction, tools and ornaments, and other material culture (Ichikawa, 2009). Therefore, the problem is how to reconcile these often opposing interests in the global concern for conservation and needs of local people. To those who, from a global perspective, want to save the tropical rainforests, the local inhabitants have been regarded as people who, because of their “poverty,” destroy the forests. At best, they have been thought of only as people who should be compensated for losing their access to resources due to conservation projects, or as the object of “environmental education” or “*sensibilisation*,” to make them understand the importance of forest preservation. There were, until recently, little attempt to understand the perception and use of the forest by these forest-dependent people, who may have long been coexisting with the forests. The ecological,



**Fig. 2.** Forest culture: A diversity of plant materials are used in a camp of Mbuti hunter-gatherers.

cultural and historical relationship between the inhabitants and the forests had only drawn the attention of some anthropologists.

We have been making surveys of hunting-gatherers' societies and shifting cultivators' societies in African rainforests since the 1970s (Fig. 1). We have been interested chiefly in clarifying how the people whose lives are heavily dependent on the forests view nature and make use of it. Recently these issues have started to draw wider attention, but when we began our study, there was only a few, even among anthropologists, who was interested in such things. But to us it was a great joy to make our way, with the help of forest peoples, into the fascinating world of the interrelationship between forest and people.

If we walk the forest with the people, even briefly, we immediately understand that they have rich knowledge of its flora and fauna. There is so much they have to tell about all of the various trees, the footprints the animals have left in the ground, the sounds that seem to come out of somewhere in the forest. We actually need only glance at a forest camp to see how much they owe to the forest (Fig. 2). From their small huts to the baskets they use to carry things—everything is made from materials taken from the forest. Here and there one sees the fruit and roots they have gathered in the forest. Most of the toys the children play with are made from the seeds, wood and leaves of the forest's plants. And when the sun goes down, they sing and dance late into the night together with the Spirit that appears out of the forest in response to the polyphony that bubbles up. An intimate involvement with the forest is seen, not only in material aspects such as food, housing and tools, but in many aspects

of life, even in plays and rituals. Their culture makes full use of a variety of possibilities that the forest provides.

In spite of the importance to global as well as local environments for human life, the forests in this region have been heavily logged in recent years, particularly in the period just after the economic crisis of the countries in the region from the end of 1980s to early 90s (Kitanishi, 2010). The target area of logging now shifted to post-conflict DRC (the Democratic Republic of the Congo), where severe internal war had hindered the logging operations during the war period. When the peace accord was signed at Pretoria in 2002, 43.5 million hectares of forest, more than a half of the entire lowland forest area of the country, had already been divided up into logging contracts (World Bank, 2006). These contracts were granted without consideration for other forest uses, or equitable return for the country and its people, and without consultation with local people who depend on the forest for their subsistence and cash income. In 2002, when the new Forest Code was approved, DRC government rescinded more than two-thirds of these logging titles, following the advice (or pressure) from the World Bank (World Bank, 2006). However, in 2007, almost five years after the rescinding, there still remained more than 100 forest contracts covering about 20 million hectares. These contract areas include crop fields, fallow lands, and village sites, to say nothing of the forest camps of hunter-gatherers in the areas. The DRC government, therefore, launched the review of these contract, with the strong suggestion and assistance by the World Bank. As a result, another several dozens were rescinded from the remaining contracts. But it is not clear that these were approved after really a “free, prior, and informed consent” with the local people in a meaningful way (World Bank Inspection Panel, 2007).

It became clear through these processes, that the local people and their rights to the forests have been neglected. Neglect of the Congolese forest people date back to much older time, to the period of early occupation by the Belgium King and the following colonial period. The “Congo Free State” under the King Leopold II regarded the forest as “vacant, unoccupied land” that belongs to the State. The “vacant land” in this case included fallow lands, hunting and gathering ground, and any other types of land that were not permanently occupied. The colonial Forest Law and post-independent Bakajika Land Law (1967) stipulate that the forests formally belong to the State, though the customary use of the forest resources has been allowed (World Bank Inspection Panel, 2007). The rights of local people had thus been “officially” neglected, until the new Forest Code (Government of DRC, 2002) clearly mentioned the “rights” of local people to the forest in the legal text for the first time in DRC forestry history, although the forest still belongs officially to the State even in the new Forest Code.

Westerners, including journalists and novelists have also contributed to the neglect of the forest people. For example, Henry Morton Stanley, who travelled throughout the Congo River forests, gave to his book, the title *Through the Dark Continent* (1878) and *In Darkest Africa* (1891). Or, British writer, Joseph Conrad wrote a famous novel titled *Heart of Darkness* (1902). These illustrate

well how the forests in the Congo Basin have been perceived by modern Europeans. The Central African forests are dark, and darkest part of the world, which is exactly contrary to the image of culture and history of the modern Western world.

However, the question of history of human habitation has never been asked in these accounts. I would, therefore, like to show the "history," through examining the possibility of historical human impacts on the environment in the Congo Basin forests. My point is that, by showing the long history of human habitation in and co-existence with, the forests, a legitimate basis for the rights of people to the forests may be provided. I will start the discussion with an example of "Wild Yam Question," a hypothesis proposed by Bailey et al. (1989) and Headland (1987; 1997) sometime ago.

### THE WILD YAM QUESTION

The *Wild Yam Question* is based on the following observations: (1) All the contemporary hunter-gatherer groups in the tropical rainforests maintain exchange relationships with neighboring agricultural groups, and depend, more or less, on agricultural products for food energy source. (2) No archaeological remains have been found which suggest early existence of hunter-gatherers in the tropical rainforest regions. (3) Some even argue that there are not enough wild food in the forest that can support human subsistence throughout the year, particularly in the lean period of dry season, when fruit and honey are hardly available. The *Wild Yam Question* derives from this last point, because wild yams are supposed to be the key food for the hunter-gatherer subsistence in the forest.

Since this hypothesis was proposed, various researchers have tackled this problem, including Bahuchet et al (1991), Dounias (1993) and Sato (2001). But, few have ever examined the problem based on the quantitative data obtained from observations of actual foraging life in the forest.

One of our former students, Dr. Hirokazu Yasuoka, accompanied the Baka Pygmies in a long-term foraging expedition called *molongo*, and collected quantitative data on the diet and subsistence activities (Yasuoka, 2006). He weighed all the food taken at the camps and calculated the food energy intake. During the *molongo*, Baka people had enough food, taking 1800–2700 kilocalorie per adult consumption-day; particularly at a long-stay camp, they consumed even more than they do in the village camp where agricultural food is available. The major food during this phase is annual yams (yams with annual stems), which provide more than 60% of total energy intake. In this way, he has shown that foraging life is possible, even in the dry season, when the food resources are generally thought to be scarce.

Then, where are these yams found in the forest? In the research that followed, Yasuoka surveyed the vegetation, and distribution of yam species in the forest, by setting transects in various parts of the forests (Yasuoka, 2009a; 2009b). The results clearly show that annual yams favor open, brighter habitat,



**Table 1.** Densities of annual yam stems (stems/ha) and ratios of forest gaps and closed canopy in the surveyed plots (after Yasuoka, 2009a).

Plot No.	1	2	3	4	5	6	7
Distance (km)	13	17	22	28	33	37	32
Closed canopy (%)	60	38	33	63	38	20	30
Gap (%)	40	62	23	37	62	80	70
<i>D. praehensilis</i>	0	0	0	0	0	28	0
<i>D. semperflorens</i>	1.0	0	0	0	2.5	0	21

which is indicated by the fact that two annual species are found in places with higher ratio of ISF (Indirect Site Factor), that is, with higher light levels, compared with perennial yam species, which are found in more closed, darker areas.

Table 1 shows the distance of each surveyed plot from the roadside villages, ratios (percentage) of open canopy (called *bi* in the Baka language) and closed canopy (*manja*) in each plot, and the number of yam stems found per hectare. It is clear from this table, that two species of annual yams occur in the plots with higher ratio of open canopy forests, or gaps. But, it should also be noted, that gaps are omnipresent, occurring in other plots, though more or less with lesser frequencies, whereas annual yam stems are found only in limited places. Where they are found, they are concentrated, gregarious, and provide huge quantity of food; but in most of other places, even in forest gaps, there are virtually no stems found in the plots. This corresponds well with an earlier finding by Dounias (1993) that distribution of yams is very uneven in the forest.

Then, what is the factor that has facilitated their growth in such a large quantity in specific sites, but not in other places. The annual yams supply food for more than 50 people at least for a few months. The Baka people exactly know the places of these yam-abundant places, and because of this knowledge, they dare to go to such a remote place, more than 30 km away from their present village, to subsist mainly by collecting wild yams.

While looking for maps in the National Archive in Yaounde, we found an old map published in 1910 by a German Cartographer, named Max Moisel. In this old map, we found several old village sites in the study area, which is now part of the Boumba-Bek National Park. Yasuoka also found other old village sites from the interviews with the Baka elders during the *molongo* period. Interestingly, the yam-abundant places are located close to these old village sites (Yasuoka, 2009a). Presumably, this spatial proximity is not just a coincidence. There may be some links of the annual yam distribution, with human habitation and activities. The formation of large clearings near the settlements must have created a favorable environment for the annual yams to grow, because these yams favor the disturbed environment with sufficient light. A kind of para-

cultivation, which, according to Dounias (2001), involves replanting the yam stems in the same places, or, more advanced proto-cultivation, which involves more elaborate care and shift of planting sites, may have also played a part for creating such yam-abundant places. I do think, that the possibility of human intervention in the formation of yam-patches in the central African forests, merits further investigation.

Thus, the Cameroon case shows that: (1) Annual wild yams are the major source of food during the dry season foraging expedition, called *molongo*. (2) Annual yams favor an open habitat. (3) While open habitats is omnipresent in the forest, the distribution of annual yams is locally concentrated. (4) Such concentrated yam patches are found far from the present village site, but close to former, abandoned village sites. Wild yam abundant patches may have been formed under human impacts. (5) Wild yam question, therefore, cannot be answered, without understanding the historical ecology of the forest environment, that is, long-term interactions between human activities and forest environment.

More generally, these findings lead us to examine extensive human influences on the forests of the Congo basin, even if the forests appear to be intact.

## HUMAN IMPACTS IN A WIDER PERSPECTIVE

Let me discuss a little more on the human impacts in a wider framework. During our ethnobotanical research in the Ituri Forest of the Democratic Republic of Congo (DRC), we noticed that many of the important food plants require sufficient sunlight for germination and growth (see, Hart & Hart, 1986; Ichikawa, 1996). For example, *Antrocaryon* and *Ricinodendron*, both producing oil-rich nuts, are often found as big canopy trees in the dense forest, but they are shade-intolerant, and must have germinated and grown where there was sufficient light. Where a big tree of *Canarium schweinfurthii*, another sun tree species which produces a quantity of edible fruit, is found in the dense forest, such a place is said to have been either old village or camp site (Ichikawa, 2001). These trees must have grown in the "gaps," where sufficient sunlight once reached to the ground.

In the forest, there are scattered "gaps" made by storms, lightening and other natural causes. In addition to these natural gaps, there are also human-made gaps in the forest. For collecting honey, they sometimes cut down a tree with an ax, thus making a gap similar to the natural one. Cutting small to medium-sized trees for opening a new campsite will bring sufficient sunlight to the ground. In these ways, human habitation and activities change the light condition in the forest.

There are often seedlings of important food plants in and around campsites, such as *Landolphia* spp., *Treculia africana*, *Ricinodendron heudelotii* and others, that have germinated from the discarded food, and grown under a favorable light condition.

Moreover, large quantities of minerals and organic matters are concentrated in the campsite in the form of food, fuels and other resources which are collected





**Fig. 3.** Agriculturalists' village (a) and field sites (b) in the Ituri Forest of DRC.

from a wide range of the forest, consumed at the camp, then form a large deposit of organic matters and minerals. While there are hardly reliable data on such “concentration effects” by human activities, a rough estimation could be attempted here. A household of 5 persons use about 10 to 15 kg of firewood a day. The firewood consumed by 10 households, or 50 people, which is close to the average size of a camp, during a month period, thus amounts to 3 to 4.5 tons, and the ashes from the firewood are deposited around the campsite. There are also minerals and organic matters supplied from the food. While all of these are not absorbed by the soil, the nitrogen supplied from the food alone is roughly estimated to be equivalent to 200 kg of ammonium sulfate (Ichikawa, 2001). By simply living in a camp, humans deposit such a large quantity of nutrients. They, therefore, contribute to concentrating these otherwise thinly distributed soil nutrients in localized patches, that is, in the campsites.

However, hunter-gatherer habitation and subsistence activities have imposed only a limited impact. The villagers' settlements and agricultural activities have stronger impacts on the forest vegetation, because, in slash-and-burn agriculture, larger areas are cleared for cultivation (Fig. 3 a & b). Most of the villagers' settlements in the Ituri Forest are now located along the major roads penetrating the forest. But before 1930s, when these roads were constructed, there had been scattered small villages throughout the forest, some of which can still be located in the satellite images as old secondary forests (Ichikawa, 2001). Moreover, before the colonial period, or even during the colonial period, villages shifted more frequently. All these movements must have had extensive impacts on the forest landscape.

For the last 10 years, researchers from Kyoto University have been investigating the impact of human activities on the forest environment. They are conducting detailed surveys of the growing conditions of edible plants, the traces of human activities and their impacts on the vegetation in the various types of forest vegetation, such as old camps, former village sites and abandoned fields. They are particularly interested in the aforementioned

distribution of edible plants and the impact of human activity on the vegetation in the past. They are also researching the history of the movement of shifting cultivators who were once widely dispersed throughout the forest, and the changes in vegetation after settlements were abandoned (Shikata, 2006). From these studies they say that there are old secondary forests which indicate sites of human habitation in the past, sites which dot even the land designated today as national parks. There might even be some ecological relationship between the abundance of fauna of this region and the human activities of the past. In any case, if a positive impact of human activity on the natural environment can be established through this series of surveys, we would know that these people do not merely depend on the forest and its products, but that they supply the conditions for its regeneration as well.

Furthermore, we suspect the involvement of human beings in the formation of the forest in this region. In the western part of the Congo Basin the amount of rainfall changes with the seasons, so that, unlike in an ordinary tropical rainforest, there are semi-deciduous forests with trees shedding leaves in the dry season. These consist mainly of large trees with trunks over one meter in diameter, such as *Triplochiton scleroxylon* of Sterculiaceae family (Aubreville, 1967; Letouzey, 1968). These are so-called sun trees, requiring a considerable amount of open space for germination and growth. But when one enters a forest where these trees predominate, one finds only large mature trees, but almost no young trees that would carry on the next generation, as Chujo (1992) and Shikata (2006) pointed out. From these facts, they thought that there is a possibility that the environment in which these trees grew was not the dense forest of today, but rather the forest with large, open spaces. If humans had been involved in the formation of such spaces, say in the cutting and clearing that goes with shifting cultivation, the way of looking at the forests of this region would change considerably.

In a wider and longer perspective, evidences have been found that suggest the Congo Basin Forest has been inhabited since quite a long time ago. An archaeologist, Mercader (2001; 2003; Mercader et al, 2000) described paleolithic sites inhabited by hunter-gatherers in the eastern part of the Congo Basin. He suggested, however, based on the analysis of phytoliths found in the site, that the vegetation at the time was of a drier type of forest.

The Congo Basin Forest was inhabited by the Bantu-speaking cultivators who migrated from the Cameroon-Nigeria bordering region in the first millennium before century. They migrated to the interior parts of the Congo forests during the first millennium AD, with a newly introduced crop (plantain bananas) and iron tools, both of which played very important role to the expansion of the Bantu people into the dense forests. Jan Vansina (1990) suggested, that these Bantu-speaking cultivators had reached the heart of the Congo Basin by the end of the first millennium at the latest. This means that they have been living there for more than a thousand years, possibly 1,500 years, more or less. While their population density was not high, 1,000 to 1,500 years may be long enough for them to leave their traces extensively on the forest environments.

The migrations probably first took place along the larger rivers, and they



**Fig. 4.** An aerial view of the Congo Basin forest.

formed small-scale dispersed villages in the forest. They sometimes formed an association of several neighboring villages, but never formed larger polities until recently (Vansina, 1990). Rather, when the villages became too large, they simply split into smaller units and moved further into the interior forest. In this way, they have left a mosaic vegetation, composed of village sites, fields, secondary forests of various succession stages, and mature forests, as we see in the Fig. 4.

While examining the soil in the forests of Likouala Region, northern Congo-Brazzaville, Western Congo Basin, we found many charcoal pieces from the soil. Some of them were dated at as early as 2,600 years before present. If these charcoals were made by human-induced fires, for example, in preparing the fields for slash-and-burn agriculture, cultivation in this area dates back to that age. Since then, the vegetation of that region has been under human impacts.

An aerial view of the Congo forest gives us an impression that there still remains a vast stretch of intact forest. However, as forest ecologist Richards (1953) wrote in his book, nearly 60 years ago, that, “African forests appearing as primary forest are often old secondary forests actually.” Therefore, it is necessary to re-consider the local forest landscape in the light of historical ecology.

Does the “value” of the forest go down with the acknowledgement of human footprints in the vast forests of the Congo Basin? I would hope that, on the

contrary, it would give rise to new ideas for preserving the forest that take into consideration the history and culture of its inhabitants and provide them with a legitimate basis for the customary rights to the forest.

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